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# मानक

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Mazdoor Kisan Shakti Sangathan

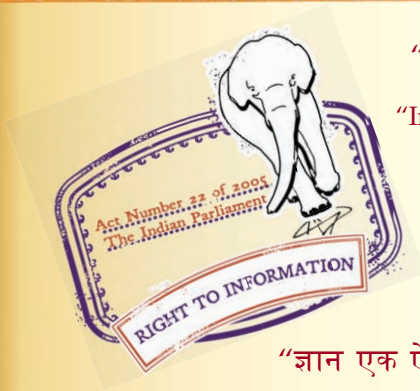
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“पुराने को छोड़ नये के तरफ”

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“Step Out From the Old to the New”

IS 6284 (1985): Test Code for Power Thresher for Cereals  
[FAD 21: Farm Implements and Machinery]



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“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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IS : 6284 - 1985

*Indian Standard*  
TEST CODE FOR  
POWER THRESHER FOR CEREALS  
( *Second Revision* )

UDC 631.361.2.07 [ 633.1 ] : 620.1



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INDIAN STANDARDS INSTITUTION  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

# *Indian Standard*

## TEST CODE FOR POWER THRESHER FOR CEREALS

### ( *Second Revision* )

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*( Continued from page 1 )*

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**AMENDMENT NO.1 NOVEMBER 1991**  
**TO**  
**IS 6284 : 1985 TEST CODE FOR POWER THRESHER**  
**FOR CEREALS**  
*( Second Revision )*

*( Page 13, clause 8.1.11 )* -- Delete.

**(FADC 31 )**

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Reprography Unit, BIS, New Delhi, India

# AMENDMENT NO. 2 OCTOBER 1996 TO IS 6284 : 1985 TEST CODE FOR POWER THRESHER FOR CEREALS

( *Second Revision* )

( *Page 4, Fig. 1, Terms* ) — Substitute 'UPPER CONCAVE' for 'THRESHING DRUM'.

( *Page 10, clause 8.1.4, Note* ) — Delete.

[ *Page 10, clause 8.1.4.1(a)(iii)* ] — Substitute '20 seconds' for '60 seconds'.

( *Page 10, clause 8.1.4.3, Note* ) — Delete.

( *Page 11, clause 8.1.4.4, Note* ) — Delete.

( *Page 11, clause 8.1.5, Note* ) — Delete.

( *Page 13, clause 8.1.10 ( see also Amendment No. 1 )* ) — Insert the following new clauses after 8.1.10:

**'8.1.11 Determination of Corrected Output Capacity** — To avoid the variation of moisture content of grain and grain crop ratio, the output capacity as obtained under 8.1.10 should be corrected by the following formula:

$$W_1 = [ W - W ( M - m ) / 100 ] r / R$$

where

- $W_1$  = corrected output capacity,
- $W$  = output capacity ( see 8.1.10 ),
- $M$  = observed moisture content ( see 5.2 ),
- $R$  = observed grain ratio in percent ( see 5.1 ), and
- $m$  and  $r$  = constants for different crops as given in following table ( see Note ).

Crops	$m$	$r$
Wheat	12	40
Paddy	20	40

NOTE — The value of  $m$  and  $r$  for other crops will be added later on.

**Amend No. 2 to IS 6284 : 1985**

**8.1.11.1** Record the data in Data Sheet as given in Appendix H.'

( *Page 14, clause 8.2* ) — Substitute the following for the existing clause:

**'8.2 Long Run Test** — Operate the thresher at least 20 hours at load for each recommended crop which should be covered by continuous run of at least 5.0 hours. Record the major breakdown, defects developed, repairs and average grain output after the test in data sheet as given in Appendix J.'

( FAD 59 )

**AMENDMENT NO. 3 MAY 2002**  
**TO**  
**IS 6284 : 1985 TEST CODE FOR POWER THRESHER**  
**FOR CEREALS**

( *Second Revision* )

( Page 9, clause 8.1.2 ) Delete

[ Page 13, clause 8.1.11 ( see also Amendment No 2 ) ] — Substitute the following for the existing text

**8.1.11 Determination of Corrected Output Capacity** — To avoid the variation of moisture content of grain and grain-crop ratio, the output capacity as obtained under 8.1.10 should be corrected by the following formula

$$W_1 = \left[ \frac{W r}{100} \frac{(100 - M_1)}{(100 - m_1)} + \frac{(100 - R) (1000 - M_2)}{R(100 - m_2)} \right]$$

Where

$W_1$  = corrected output capacity,

$W$  = observed output capacity,

$R$  = grain crop ratio,

$M_1$  and  $M_2$  = moisture content of grain and straw respectively at observed grain-crop ratio, and

$m_1$ ,  $m_2$  and  $r$  = Standard moisture content of grain, straw, and standard grain-crop ratio in percent as given below

Crops	$m_1$	$m_2$	$r$
Wheat	9	7	40
Paddy	20	22	40
Bengal Gram	8	7	50
Sorghum (ear head)	8	9	75
Soybean	9	9	40

### **Amend No. 3 to IS 6284 : 1985**

NOTE — Maximum moisture content of grain during threshing shall be 16 to 25 for paddy and 10 to 14 percent for other grains.

( FAD 59 )

***Indian Standard***  
**TEST CODE FOR**  
**POWER THRESHER FOR CEREALS**  
***( Second Revision )***

**0. FOREWORD**

**0.1** This Indian Standard ( Second Revision ) was adopted by the Indian Standards Institution on 24 October 1985, after the draft finalized by the Harvesting and Threshing Equipment Sectional Committee had been approved by the Agricultural and Food Products Division Council.

**0.2** This standard was first published in 1971 and revised in 1975. While implementing the standard, some difficulties were faced by the testing authorities. A need was, therefore, felt to revise this standard. The present revision incorporates *inter alia* following changes:

- a) Earlier version was meant for power threshers for wheat where as in this revision scope has been enlarged to cover threshers for cereals,
- b) Checking of the safety provisions in details has been included,
- c) Method of moisture determination for straw has been included, and
- d) Specific reference has been made for those tests which are to be conducted for certification purposes.

**0.3** In one of the conventions of Indian Society of Agricultural Engineers, it was suggested that root mean square (RMS) power value should be used as thresher power rating instead of present technique of mean value. While considering this suggestion, committee was of the view that at present no testing station is equipped with the instrumentation for recording RMS value and decided to continue the present method of recording mean value.

**0.4** In preparation of this standard, assistance has been derived from the Central Farm Machinery Testing and Training Institute, Budni.

**0.5** In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off it shall be done in accordance with IS : 2-1960\*.

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\*Rules for rounding off numerical values ( revised ).

## 1. SCOPE

**1.1** This standard prescribes the method for testing of power thresher for cereals to evaluate its performance and durability.

## 2. TERMINOLOGY

**2.0** For the purpose of this standard, the following definitions shall apply.

**2.1 Broken Grain** — Wholly or partially cracked or broken grain.

**2.2 Clean Grain** — Threshed grain free from foreign matter ( *see 2.7* ) and broken grain ( *see 2.1* ).

**2.3 Cleaning Efficiency** — Clean grain ( *see 2.2* ) received at main grain outlet(s) with respect to the total grain mixture ( *see 2.8* ) received at main grain outlet(s) expressed as percentage by mass.

**2.4 Concave Clearance** — The clearance between beater or cylinder tip and concave ( *see Fig. 1* ).

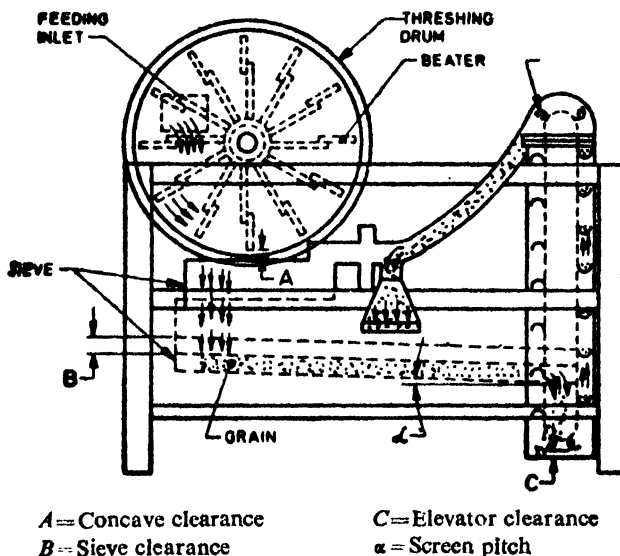


FIG. 1 CROP FLOW DIAGRAM OF A TYPICAL POWER THRESHER

**2.5 Elevator Clearance** — The clearance between the grain elevator and its casing ( *see Fig. 1* ).

**2.6 Feed Rate** — The quantity of crop fed into the inlet of thresher per unit of time.

**2.7 Foreign Matter** — Includes inorganic and organic matter. The inorganic matter comprises sand, gravel, dirt, pebbles, stones, lumps of earth, clay, mud, iron chips, etc. The organic matter comprises chaff, straw, weed seeds and other inedible grains.

**2.8 Grain Mixture** — The mixture of clean, broken, unthreshed grains and foreign matter coming out of the main grain outlet(s).

**2.9 Maximum Input Capacity** — The maximum feed rate ( *see 2.6* ) at which no choking occurs in the thresher and no stalling occurs in the prime mover ( *see 2.17* ) at the speed specified by the manufacturer.

**2.10 Output Capacity** — The mass of the grain mixture received at all grain outlet(s) when collected at rated input capacity ( *see 2.24* ).

**2.11 Percentage of Blown Grain** — The clean grain ( *see 2.2* ) lost along with chaffed straw (*BHUSA*) with respect to total grain input expressed as percentage by mass.

**2.12 Percentage of Broken Grain** — The broken grain ( *see 2.1* ) collected from all grain outlets with respect to total grain input expressed as percentage by mass.

**2.13 Percentage of Spilled Grain** — The clean grain ( *see 2.2* ) dropped through the sieve and overflowed from sieve along with tailings with respect to total grain input, expressed as percentage by mass.

**2.14 Unthreshed Grain** — Grain collected from unthreshed heads.

**2.15 Percentage of Unthreshed Grain** — The unthreshed grain ( *see 2.14* ) from all outlets with respect to total grain input, expressed as percentage by mass.

**2.16 Power Thresher** — A machine operated by a prime mover such as electric motor, engine, tractor, power tiller, used for threshing.

NOTE — The threshers may be designed to make *BHUSA*, to separate the grains, to clean the grain with or without elevating system for the direct bagging.

**2.17 Prime Mover** — A machine used for operating the thresher, such as electric motor, tractor and engine.

**2.18 Routine Test** — Tests carried out on each thresher to check the requirements which are likely to vary during production.

**2.19 Sample** — The quantity of grain or straw taken from an outlet for a specified period of time.

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**2.20 Screen Slope** — Inclination of screen with the horizontal plane in degrees ( *see* Fig. 1 ).

**2.21 Sieve Clearance** — The vertical distance between two successive sieves ( *see* Fig. 1 ).

**2.22 Threshing Efficiency** — The threshed grain received from all outlets with respect to total grain input expressed as percentage by mass.

**2.23 Type Test** — Tests carried out on the thresher to ascertain conformity with the requirements of the relevant Indian Standard. These are intended to ascertain the general qualities and design of a particular type of thresher.

**2.24 Rated Input Capacity** — The feed rate ( *see* 2.6 ) at which efficiencies are within the specified limits of the relevant Indian Standards.

NOTE — For hammer mill type thresher refer to IS : 6320-1985\*.

### **3. SELECTION AND SPECIFICATION OF THRESHER FOR TEST**

**3.1 Selection of Thresher** — For commercial test report or for certification purpose, the power thresher shall be selected from the series production by the testing authority. For proto type testing or for confidential test report the thresher shall be submitted by the manufacturer.

**3.2 Specification and Other Literature** — The manufacturer shall supply all literature, operational manual and the schematic diagram of flow of the material in the power thresher ( *see* Fig. 1 ). The manufacturer shall also supply the specification sheet given in Appendix A duly filled in as well as furnish any further information which might be required to carry out the tests. The manufacturer shall also indicate the maximum input capacity, rated input capacity and output capacity of the thresher and names of the crops which can be threshed and any adjustment required to be made for the same.

NOTE — Operational manual should also include maintenance schedules and safety precautions ( *see* IS : 9019-1979† ).

## **4. TESTS**

### **4.1 Type Tests**

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\*Specification for wheat power thresher ( hammer mill type ) ( *first revision* ).

†Code of practice for installation, operation and preventive maintenance of power threshers.

**4.1.1 General**

- a) Checking of specification ( *see 6.1* )
- b) Checking of material ( *see 6.2* )
- c) Visual observations and provision for adjustments ( *see 6.3* )
- d) Safety provisions ( *see 6.4* )

**4.1.2 Test at No Load**

- a) Power consumption ( *see 7.1* )
- b) Visual observation ( *see 7.2* )

**4.1.3 Test at Load**

**4.1.3.1 Short run ( *see 8.1* )**

- a) *Quality of work*
  - i) *Losses*
    - 1) Percentage of broken grain [ *see 8.1.6(b)* ]
    - 2) Percentage of blown grain [ *see 8.1.6(c)* ]
    - 3) Percentage of unthreshed grain [ *see 8.1.6(d)* ]
    - 4) Percentage of spilled grain [ *see 8.1.6(e)* ]
  - ii) *Efficiency*
    - 1) Threshing [ *see 8.1.7(a)* ]
    - 2) Cleaning [ *see 8.1.7(b)* ]
- b) *Power consumption* ( *see 8.1.8* )
- c) *Capacity*
  - i) Rated input capacity ( *see 8.1.9* )
  - ii) Output capacity ( *see 8.1.10* )
  - iii) Corrected output capacity ( *see 8.1.11* )
- d) *Visual observations* ( *see 8.1.4.6* )

**4.1.3.2 Long run ( *see 8.2* )**

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## **4.2 Routine Tests**

- a) Visual observations and provisions for adjustments ( *see* 6.3 )
- b) Test at no load ( *see* 7.1 and 7.2 )
- c) Safety provisions ( *see* 6.4 )

## **5. PRE-TEST OBSERVATIONS**

**5.1 Determination of Grain-Crop Ratio** — Take five samples of the crop each weighing about one kilogram. Separate the grains from the stalks manually for each sample, take the mass of grain and straw separately for each sample and express it as the percentage of the mass of the crop sample. The average of the five samples shall be taken as the grain-crop ratio.

**5.2 Moisture Content of Grain and Straw** — Take suitable samples of grain and straw as obtained in 5.1. The grain and straw samples should be tested for moisture content in accordance with IS : 4333 ( Part 2 )-1967\* and 6.1 of IS : 7897-1975† respectively.

**5.3 Running-in and Preliminary Adjustments** — Before commencing the tests, the power thresher shall be run-in for at least one hour by the testing authority as per the instruction of the manufacturer. The adjustments for the speed of different shafts, concave clearance, speed of prime mover, screen slope, etc, shall be done as per manufacturer's recommendations.

## **6. GENERAL TESTS**

**6.1 Checking of Specification** — Check all specifications mentioned by the manufacturer ( *see* 3.2 ) and record the data in the specification sheet as given in Appendix A.

**6.2 Checking of Material** — Check the material for all components and record the data in Data Sheet as given in Appendix B.

**6.3 Visual Observations and Provision for Adjustments** — Record the observations and adjustments in Data Sheet as given in Appendix C.

**6.4 Checking of Safety Provisions** — Safety provisions given in IS : 9020-1979‡ and IS : 9129-1979§ shall be checked and reported in Appendix D.

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\*Method of analysis of food grains: Part 2 Moisture.

†Test code for chaff cutter.

‡Safety requirements for power threshers.

§Technical requirements for safe feeding systems for power threshers.

## **7. TEST AT NO-LOAD**

### **7.1 Power Consumption**

**7.1.1** Install the thresher on level preferably on a hard surface and set the clearance, screen slope, etc, in accordance with manufacturer's recommendations. Use electric motor of appropriate power, fitted with an energymeter for running the thresher. The manufacturer shall declare the cropwise speed of operation in their recommendations.

**7.1.2** Run the thresher at no-load for at least 10 minutes at the specified revolution of the threshing unit and record the readings of the energymeter. Calculate power consumption at no-load for one hour.

**7.1.3** Record the data according to item (1) of Appendix E.

**7.2 Visual Observations** - During and after completing power consumption test ( see 7.1 ), the observations given in item (2) of Appendix E shall be made visually and recorded.

## **8. TEST AT LOAD**

### **8.1 Short-Run Tests**

**8.1.1** Install the thresher on level preferably on a hard surface and set the clearances, screen slope, etc, as per manufacturer's recommendations. As far as possible, the test should be conducted under close to still air condition.

**8.1.2** Take sufficient quantity of the crop of the same variety. The moisture content of the grain ( see 5.2 ) shall be between 6 and 14 percent.

**8.1.3 Attachment of Prime Mover and Thresher** — Attach the thresher with a suitable prime mover, preferably an electric motor. An energymeter or some form of transmission dynamometer shall be fitted. The power delivered to the thresher may be supplied in the following ways:

- a) Direct coupling of the prime mover with the main axle of the thresher, and
- b) Connecting the prime mover with the help of flat or V-belt and pulleys with the main axle of the threshers.

**8.1.3.1** In case of (a) the power delivered to the thresher would be the power output of the prime mover; whereas in case of (b) the allowances for flat belt and V-belt drive losses may be taken as 6 and 3 percent respectively.

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**8.1.4 Operation and Collection of Data** — Operate the thresher at the specified speed of the threshing unit for one hour at the maximum input capacity ( *see 2.9* ). During the course of operation, the provisions given in IS : 9019-1979\* shall be followed.

**NOTE** - For the purpose of certification, the thresher shall be operated at the rated input capacity ( *see 2.24* ) declared by the manufacturer.

**8.1.4.1** During the one-hour run period as in 8.1.4, collect the following samples and data:

- a) Three sets of samples at an interval of about 20 minutes ( including the time for sample collection ) at the following outlets for duration indicated against each:

- |                         |            |
|-------------------------|------------|
| i) Main grain outlet(s) | 60 seconds |
| ii) Sieve overflow      | 60 seconds |
| iii) Straw outlet       | 60 seconds |

**NOTE 1** - - The time for collection of samples should be recorded accurately.

**NOTE 2** - For ratings above 20 kW the time for collection of samples shall be as agreed to between the manufacturer and testing authority.

- b) Record the speed of main shaft by a revolution counter or an accurately calibrated tachometer. In case of electric prime mover the reading of energymeter or dynamometer shall be taken at an interval of about 60 minutes.

**8.1.4.2** At the end of one hour feeding, run the thresher idle for sometime, so that practically no material already fed comes out. At the end of the test, collect and weigh the material dropped through sieve and the grain mixture received at the main grain outlet(s). The mass of the sample collected at main grain outlet(s) [ *see 8.1.4.1(a)* ] shall be added to the mass of grain collected after one hour run. If tractor or engine is used as prime mover, record the fuel consumed during the run period.

**8.1.4.3** Repeat the test given in 8.1.4.1 and 8.1.4.2 for minimum of three times at various feed rates covering the rated input capacity ( *see 2.24* ) and approximately 50 percent of the maximum input capacity ( *see 2.9* ).

**NOTE** — This test will not be applicable for testing of thresher for certification purposes.

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\*Code of practice for installation, operation and preventive maintenance of power threshers.

**8.1.4.4** Conduct the test given in 8.1.4.1 and 8.1.4.2 at rated input capacity ( see 2.24 ) at the following threshing unit speeds.

- a) Speed about 15 percent more than specified speed, and
- b) Speed about 15 percent less than specified speed.

**NOTE** - This test will not be applicable for testing of thresher for certification purposes.

**8.1.4.5** Record the data in Data Sheet as given in Appendix F.

**8.1.4.6 Visual observations** — During and after the run tests, inspect the thresher visually and record the observations in Data Sheet as given in Appendix F.

**8.1.5 Analysis of the Samples** — Analyse the samples obtained at different outlets for different feed rates for the following:

- a) *Main grain outlet(s)* — To be analysed for unthreshed grain, broken grain and foreign material.
- b) *Straw outlet* — To be analysed for clean grain and unthreshed grain.
- c) *Sieve overflow* — To be analysed for unthreshed grain and clean grain.

The average of analysis for three sets obtained at different feed rates shall be reported.

- b) *Sieve underflow* — Take 1 6th or 1 kg of the quantity of the material dropped through the sieves and analyse for clean grain and unthreshed grain.

**NOTE** — While testing for certification purposes, there shall be only one feed rate.

**8.1.5.1** Record the data in Data Sheet as given in Appendix G.

### **8.1.6 Calculation**

- a)  $A \quad B + C + D$

where

$A$  = total grain input per unit time;

$B$  = quantity of ( threshed, clean ) grain collected from all grain outlet(s) per unit time;

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$C$  = quantity of broken grain from all outlets per unit time; and

$D$  = quantity of unthreshed grain from all outlets per unit time.

NOTE — Since the total grain input is not possible to measure accurately, the difference between the input and output should be taken as unaccountable losses.

b) Percentage of broken grain =  $\frac{C}{A} \times 100$

where

$C$  = quantity of broken grain from all outlets per unit time,

$A$  = total grain input per unit time

c) Percentage of blown grain =  $\frac{G}{A} \times 100$

where

$G$  = quantity of clean grain obtained at straw outlet per unit time, and

$A$  = total grain input per unit time.

d) Percentage of unthreshed grain =  $\frac{D}{A} \times 100$

where

$D$  = quantity of unthreshed grain obtained from all outlets per unit time, and

$A$  = total grain input per unit time.

e) Percentage of spilled grain =  $\frac{J}{A} \times 100$

where

$J$  = quantity of clean grain obtained at sieve overflow and underflow per unit time, and

$A$  = total grain input per unit time.

### **8.1.7 Determination of Efficiencies**

a) Threshing efficiency = 100 — percentage of unthreshed grain

$$\text{b) Cleaning efficiency} = \frac{M}{F} \times 100$$

where

$M$  = quantity of clean grain obtained from the sample taken at main grain outlet(s), and

$F$  - total quantity of the sample taken at main grain outlet(s).

**8.1.7.1** Record the data in Data Sheet as given in Appendix H.

### **8.1.8 Determination of Power Consumption**

**8.1.8.1** In case of energymeter fitted prime mover, the difference between two consecutive readings [ see 8.1.4.1(b) ] shall give power consumption for 60 minutes, interval.

**8.1.8.2** In case of dynamometer fitted prime mover, the average reading taken shall give the average torque required. Calculate the power requirement by the following formula:

$$\text{Power, kW} = \frac{\text{Torque, kg fm} \times \text{Speed, rev/min}}{973.363}$$

**8.1.8.3** Record the data in Data Sheet as given in Appendix H.

**8.1.9 Determination of Rated Input Capacity** — Select the feed rate at which the efficiencies ( see 8.1.7 ) are within the specified limits. This may be achieved by drawing a curve for efficiencies against various feed rates. Capacity in terms of energy consumed shall be calculated by dividing the capacity by power consumed ( see 8.1.8 )

**8.1.9.1** Record the data in Data Sheet as given in Appendix H.

**8.1.10 Determination of Output Capacity** — Take the mass of threshed grain received at main grain outlet(s) corresponding to the rated input capacity and record the data in Data Sheet as given in Appendix H.

**8.1.11 Determination of Corrected Output Capacity** — To avoid the variation of moisture content of grain and grain-crop ratio, the output capacity as obtained under 8.1.10 should be corrected at 12 percent moisture and 40 percent grain-crop ratio by the following formula :

$$W_1 = \frac{W ( M - 12 )}{88} \frac{40}{R}$$

where

$W_1$  = corrected output capacity,

$W$  = output capacity ( *see* 8.1.10 ),

$M$  = observed moisture content ( *see* 5.2 ), and

$R$  = observed grain ratio in percent ( *see* 5.1 ).

**8.1.11.1** Record the data in Data Sheet as given in Appendix H.

**8.2 Long-Run Test** — Operate the thresher for at least 20 hours at load, which should be covered by continuous run of at least 5 hours. If facilities are available it may be run for 50 hours. Record the major breakdowns, defects developed and repairs made in Data Sheet as given in Appendix J.

NOTE — For the purpose of certification the thresher shall be run at no-load for 20 hours only.

## **9. SUMMARY REPORT**

**9.1** For the guidance of the users, compile a summary report in Data Sheet as given in Appendix K.

**A P P E N D I X A**  
**( Clauses 3.2 and 6.1 )**  
**SPECIFICATION SHEET**

*To be Filled by*

Manufacturer

Testing  
Station

**1. General**

- a) Make
- b) Model
- c) Type
- d) Year of manufacture

**2. Power Unit**

- a) Type of prime mover,
- b) Recommended power, kW (hp)
- c) Type of drive

**3. Crops to be Threshed**

- a) Main crop
- b) Other crops

**4. Main Drive**

- a) Type
  - i) Directly coupled
  - ii) Belt drive
  - iii) Chain drive
  - iv) Gear drive
- b) Size of belt/chain/gear
- c) Size of pulley/sprocket
- d) Diameter of main shaft
- e) Recommended speed of main drive, rev/min

*To be Filled by*

Manu-  
facturer

Testing  
Station

**5. Threshing Unit**

- a) Type
- b) Constructional feature
- c) Diameter
- d) Width
- e) Recommended speed
- f) Number and type of bearings
- g) Number and size of beaters/projections/bars

**6 Concave**

- a) Type
- b) Diameter or width
- c) Length
- d) Concave clearance range
- e) Recommended concave clearance
- f) Method of clearance adjustment
- g) Constructional feature
- h) Method of fixing
- j) Angle of sliding pan

**7. Sieve**

- a) Type
- b) Number
- c) Total length and width
- d) Effective length and width
- e) Number of holes per cm<sup>2</sup>
- f) Size of hole
- g) Sieve clearance
- h) Screen slope range
- j) Recommended screen slope
- k) Method of mounting

*To be Filled by*

Manufacturer

Testing  
Station**8. Chaff Cutting Mechanism**

- a) Number of blades
- b) Details of blades
- c) Other details

**9. Shaker**

- a) Type
- b) Number of strokes per minute
- c) Drive
- d) Number and type of bearings

**10. Blower**

- a) Number
- b) Type
- c) Number of blades
- d) Size of blades
- e) Diameter
- f) Recommended speed
- g) Recommended air displacement
- h) Provision for changing air displacement
- j) Size of inlet opening
- k) Size of outlet opening
- m) Drive
- n) Number and type of bearing

**11. Elevator**

- a) Type
- b) Constructional details
- c) Capacity
- d) Drive

<i>To be Filled by</i>	
Manufacturer	Testing Station

- e) Grain spout size
- f) Height above ground level

**12. Crop Feeding**

- a) Type
- b) Method of feeding
- c) Height and location of feeding system
- d) Recommended maximum feed rate
- e) Size of feeding chute

**13. Transport**

- a) Type
- \*b) Number of wheels
- \*c) Size of wheels
- d) Wheel bearing
- e) Type of towing arrangement

**14. Flywheel**

- a) Number
- b) Size
- c) Mass

**15. Overall Dimensions**

- a) Length
- b) Width
- c) Height
- d) Ground clearance
- e) Total mass

NOTE 1 — The item which is not applicable in a particular thresher should be crossed while filling.

NOTE 2 — If any other items are provided, their details should be filled in.

\*In case, wheels are not provided, details of alternate provision, if any, shall be given.

**APPENDIX B**( *Clause 6.2* )**DATA SHEET FOR MATERIAL OF CONSTRUCTION**

1. **Date of Test**
2. **Material of Construction**

<i>Sl No.</i>	<i>Component</i>	<i>Material</i>	<i>Size</i>
i)	Frame		
ii)	Feeding system		
iii)	Threshing unit		
iv)	Drum		
v)	Beater/projection/bar		
vi)	Concave		
vii)	Blower		
viii)	Main shaft		
ix)	Blower shaft		
x)	Flywheel		
xi)	Sieve		
xii)	Shaker		
xiii)	Elevator		
xiv)	Transport wheel		
xv)	Pulleys		
xvi)	Sliding pan		
xvii)	Others		

**NOTE 1** — Delete the component which is not applicable to a particular thresher and add if any other component is provided.

**NOTE 2** — Column 4 should be recorded, wherever feasible.

## **A P P E N D I X C**

*( Clause 6.3 )*

### **DATA SHEET FOR VISUAL OBSERVATIONS AND PROVISION FOR ADJUSTMENTS**

#### **1. Observations**

- a) Adequacy of marking of inlet and outlets
- b) Adequacy of marking of direction of rotation of threshing unit
- c) Adequacy of protection of bearings against the ingress of dust
- d) Adequacy of safety arrangements, especially at moving points and at inlet
- e) Provision for lubrication of moving parts
- f) Provision for belt tightening
- g) Provision for transportation
- h) Provision for easy changing of components requiring frequent replacement
- j) Provision for easy replacement and cleaning of screens
- k) Provision for anti-corrosive coatings
- m) Balancing of threshing unit
- n) Welding of seams
- p) Tightness of bolts and nuts and other fasteners
- q) Other observations

#### **2. Provision for Adjustments**

- a) Feed rate
- b) Concave clearance
- c) Speed
- d) Screen slope
- e) Sieve clearance
- f) Air displacement

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## APPENDIX D

( Clause 6.4 )

### DATA SHEET FOR SAFETY PROVISIONS

#### 1. General

- a) In case the prime mover is mounted on the thresher, a protective cover shall be provided to prevent it from dust or straw falling on it.
- b) Presence of any sharp corners and protruding fasteners.

#### 2. Guards ( see 5 of IS : 9020-1979\* )

- a) Guards shall be provided to prevent accidental contact of persons or parts of clothing being caught in the transmission system.
- b) Guards shall be designed in such a way not to hinder in any adjustments, servicing and operation.
- c) Guards shall be capable of withstanding specified load.

#### 3. Feeding System

- a) Type
- b) Details of the system ( in accordance with IS : 9129-1979† )

#### 4. Cautionary Notices ( see 7.2 of IS : 9020-1979\* )

#### 5. Any Other Provision

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\*Safety requirements of power thresher.

†Technical requirements for safe feeding system for power thresher.

**A P P E N D I X E**  
**( Clauses 7.1.3 and 7.2 )**

**DATA SHEET FOR TEST AT NO-LOAD**

- 1. Power Consumption**
  - a) Source of power
  - b) Type of drive
  - c) Total time of run
  - d) Average power consumption for one hour
- 2. Observations**
  - a) Presence of any marked oscillation during operation
  - b) Presence of undue knocking or rattling sound
  - c) Frequent slippage of belts
  - d) Smooth running of shafts in their respective bearings
  - e) Any marked unusual wear or slackness in any component
  - f) Any marked rise in bearing temperature
  - g) Other observations

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**A P P E N D I X F**  
**( Clauses 8.1.4.5 and 8.1.4.6 )**

**DATA SHEET FOR TEST AT LOAD**

- 1. Source of Power**
- 2. Power Rating, kW(hp)**
- 3. Type of Drive**
- 4. Variety of Crop**
- 5. Grain-crop Ratio**
- 6. Crop Length, mm**
- 7. Moisture Content, percent**
  - a) Straw
  - b) Grain
- 8. Concave Clearance, mm**
- 9. Screen Slope, mm**
- 10. Sieve Clearance, mm**
- 11. Air Flow, m<sup>3</sup>/Sec**

**12. Test Data\***

Sl No.	Date	Start- ing Time	Finish- ing Time	Stoppage, If Any	Dura- tion of Opera- tion	Speed† ( rev/ min )	Feed Rate kg/h
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

Total Quantity of Crop Feed kg	Power Consumption		Torque NM	Power Consu- med During Test ( kWh )	Fuel Consu- med, If Any ( l/h )
	Energy meter reading at the start of test (kWh)	Energy meter reading at the end of test ( kWh )			
(9)	(10)	(11)	(12)	(13)	(14)

No. of Samples	Quantity (kg) of Samples From			Total Quantity of Grain Mixture at Main Grain Outlet(s) (kg)	Total Quantity of Grain Mixture at Sieve Under Flow (kg)
	Main grain outlet(s)	Sieve over- flow	Straw outlet		
(15)	(16)	(17)	(18)	(19)	(20)
i)					
ii)					
iii)					

\*The data should be collected for every test conducted on different feed rates.

†Test should be conducted at specified speed and speeds 15 percent less and more than specified.

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**13. Observations**

- a) Presence of any marked oscillation during operation
- b) Presence of undue knocking or rattling sound
- c) Frequent slippage of belts
- d) Smooth running of shafts in their respective bearings
- e) Frequent clogging of threshing units
- f) Frequent clogging of sieve aperture
- g) Smooth flowing of material through different components
- h) Vibration free running of fan
  - j) Frequent clogging of grain in elevator unit
- k) Any marked rise in bearing temperature
- m) Any marked wear, deformation and breakdown
- n) Frequent loosening of fasteners
- p) Other observations, if any

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## APPENDIX G

( Clause 8.1.5.1 )

## DATA SHEET FOR ANALYSIS OF SAMPLES

Sl No.	Feed Rate	Threshing Unit Speed	Sample From	Set of Samples	Total Mass of Sample (kg)	Mass of Sample of Analysed	Mass of			
							Unth-reshed grain	Broken grain	Clean grain	Foreign material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		i) Main grain outlets(s)		1						
				2						
				3						
		ii) Sieve overflow		1						
				2						
				3						
		iii) Sieve underflow		1						
				2						
				3						
		iv) Straw outlet(s)		1						
				2						
				3						

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NOTE — For different feed rate and for different speed of threshing unit, use the same Data Sheet as above.

## **A P P E N D I X H**

( *Clauses 8.1.7.1, 8.1.8.3, 8.1.9.1, 8.1.10 and 8.1.11.1* )

### **DATA SHEET FOR EFFICIENCIES, POWER REQUIREMENT AND CAPACITIES**

Sl No.	Item	Test No.				
		1	2	3	4	Others
1.	Threshing unit speed					
2.	Feed rate, kg/h					
3.	Power required, kW					
4.	Total grain mixture received at main grain outlet(s)					
5.	Percentage of unthreshed grain					
6.	Percentage of broken grain					
7.	Percentage of blown and spilled grain					
8.	Threshing efficiency					
9.	Cleaning efficiency					
10.	Rated input capacity, kg/h					
11.	Rated input capacity kg/kWh					
12.	Output capacity, kg/h					
13.	Output capacity, kg/kWh					
14.	Corrected output capacity kg/kWh					

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## **A P P E N D I X J**

*( Clause 8.2 )*

### **DATA SHEET FOR LONG-RUN TEST**

- 1. Total Running Time**
- 2. Continuous Running Time**
- 3. Breakdowns in Threshing Unit**
- 4. Breakdowns in Cleaning Unit**
- 5. Breakdowns in Elevating Unit**
- 6. Breakdowns in Body**
- 7. Any Major Repairs Conducted**
- 8. Any Other Observations**

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## **A P P E N D I X K**

*( Clause 9.1 )*

### **SUMMARY REPORT**

- 1. Name of Manufacturer**
- 2. Model Number**
- 3. Name of Testing Station**
- 4. Brief Description of the Thresher**
- 5. Type and Variety of Crop**
- 6. Grain-Crop Ratio**
- 7. Moisture Content**
  - a) Straw**
  - b) Grain**

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- 8. Adjustments**
  - a) Speed
  - b) Screen slope
  - c) Concave clearance
  - d) Sieve clearance
  - e) Air displacement
- 9. Power Requirement, kW**
  - a) At no-load
  - b) At load on rated input capacity
- 10. Percentage of Broken Grain**
- 11. Percentage of Unthreshed Grain**
- 12. Percentage of Blown and Spilled Grain**
- 13. Rated Input Capacity, kg/h**
- 14. Variation on Rated Input Capacity**
  - a) At 15 percent more than specified speed
  - b) At 15 percent less than specified speed
- 15. Rated Input Capacity, kg/kWh**
- 16. Output Capacity, kg/h**
- 17. Output Capacity, kg/kWh**
- 18. Corrected Output Capacity, kg/kWh**
- 19. Threshing Efficiency**
- 20. Cleaning Efficiency**
- 21. Any Marked Observation Affecting Performance**
- 22. Any Marked Breakdowns**
- 23. Other Observations**

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